IN THE CLAIMS:

Please cancel claims 1-19, without prejudice, and add the following new claims 20-74.

--20. The method of manufacturing a multi-channel array droplet deposition apparatus which comprises providing a plurality of like modules; each module comprising a base sheet having a layer piezoelectric material poled normal to said sheet, an array of parallel, open-topped droplet liquid channels being formed in said base sheet layer so that the piezoelectric material provides upstanding wall separating successive channels, and electrodes being formed on channel facing surfaces of the walls, butting together said plurality of like modules; providing a channel closure sheet, forming said channel closure sheet with an array of parallel conductive tracks spaced at intervals corresponding with the channel spacing, locating the channels in position parallel with and opposite said tracks; sealing the closure sheet to the channel walls of more than one of said like modules by forming bonds which mechanically and electrically connect each track to the electrodes on the channel facing sides of the walls of the channel opposite thereto; providing nozzles respectively communicating with the channels and providing means for connecting a source of droplet liquid to the channels.

21. Method according to Claim 20, characterized by connecting drive current circuits to the tracks prior to forming said bonds.

22. Method according to Claim 21, characterized by grouping drive current circuits together on a channel closure sheet and connecting the grouped drive current circuits via respective tracks to electrodes on the channel facing walls of channels formed in different ones of said like modules.

23. Method according to Claim 22, characterized by providing said grouped drive current circuits in a drive chip located on the channel closure sheet.

24. Method according to Claim 23, characterized by forming said drive chip by deposition thereof on a closure sheet.

25. Method according to Claim 20, wherein said bonds are solder bonds.

26. Method according to Claim 20, wherein the closure sheet is in one piece and sealed to the channel walls of all of said like modules, thereby spanning the full width of the array.

27. Method according to Claim 26, characterized by connecting drive current circuits to the tracks prior to forming said bonds.

28. Method according to Claim 27, characterized by grouping drive current circuits together on a channel closure sheet and connecting the grouped drive current circuits via respective tracks to electrodes on the channel facing walls of channels formed in different ones of said like modules.

29. Method according to Claim 28, characterized by providing said grouped drive current circuits in a drive chip located on the channel closure sheet.

30. Method according to Claim 29, characterized by forming said drive chip by deposition thereof on a closure sheet.

31. Method according to Claim 29, characterized by providing on said closure sheet a plurality of drive chips and a set of input signal tracks, the set of input signal tracks being connected to each of said drive chips.

32. Method according to Claim 31, characterized by forming said plurality of drive chips by deposition thereof on said closure sheet.

33. Method according to Claim 26, wherein said bonds are solder bonds.

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34. A multi-channel array droplet deposition apparatus comprising a plurality of like modules, each module comprising a base sheet having a layer of piezoelectric material poled at normal thereto, an array of parallel, open-topped, droplet liquid channels in said base sheet layer provided by upstanding channel separating walls formed in said layer, electrodes provided on channel facing surfaces of the walls and wherein said plurality of like modules are butted together, said apparatus further comprising a channel closure sheet bonded to the walls of more than one of said modules, nozzles respectively communicating with the channels and means for supplying droplet liquid to the channels, wherein said channel closure sheet has an array of parallel conductive tracks thereon spaced at intervals

corresponding with the channel spacing and disposed parallel with and opposite the channels and bonds mechanically and electrically connect each track tot he electrodes on the channel facing walls of the channel opposite thereto and seal the closure sheet to the channels.

35. The apparatus ~~Apparatus~~ according to Claim 34, wherein drive current circuits are grouped together on said channel closure sheet and connected via respective tracks to said electrodes on the channel-facing walls of channels formed in different ones of said like modules.

36. The apparatus ~~Apparatus~~ according to Claim 35, wherein said grouped drive current circuits are located in a drive chip on the channel closure sheet.

37. The apparatus ~~Apparatus~~ according to Claim 36, wherein said drive chip is formed by deposition on said closure sheet.

38. The apparatus ~~Apparatus~~ according to Claim 34, wherein said bonds are solder bonds.

39. The apparatus ~~Apparatus~~ according to Claim 34, wherein the closure sheet is in one piece and sealed to the channel walls of all of said like modules, thereby spanning a ~~the~~ full width of the array.

40. The apparatus ~~Apparatus~~ according to Claim 39, wherein drive current circuits are grouped together on said channel closure sheet and connected via respective tracks to said electrodes on the channel-facing walls of the channels formed in different ones of said like modules.

41. The apparatus ~~Apparatus~~ according to Claim 40, wherein said grouped drive current circuits are located in a drive chip on the channel closure sheet.

42. The apparatus ~~Apparatus~~ according to Claim 41, wherein said drive chip is formed by deposition on said closure sheet.

43. The apparatus ~~Apparatus~~ according to Claim 39, wherein a plurality of drive chips and a set of input signal tracks is provided on said cover, the set of input signal tracks being connected to each of said drive chips.

44. The apparatus ~~Apparatus~~ according to Claim 43, wherein said plurality of drive chips is formed by deposition on said closure sheet.

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45. The apparatus ~~Apparatus~~ according to Claim 39, wherein said bonds are solder bonds.

46. The method of manufacturing a multi-channel array droplet deposition apparatus which comprises providing a base sheet having a layer of piezoelectric material poled normal to said sheet, forming an array of parallel, open-topped droplet liquid channels in said base sheet layer so that the piezoelectric material provides upstanding walls separating successive channels, forming electrodes on channel facing surfaces of the walls, testing the first sub-component thereby obtained to establish that it is working correctly, providing a channel closure sheet, forming said channel closure sheet with an array of parallel conductive tracks spaced at intervals corresponding with the channel spacing, connecting drive current circuits to said tracks; testing the second sub-component

comprising said channel closure sheet and said drive current circuits to establish that it is correctly working, locating the channels in position parallel with and opposite said tracks, sealing the closure sheet to the channel walls by forming bonds which mechanically and electrically connect each track to the electrodes on the channel facing sides of the walls of the channel opposite thereto, providing nozzles respectively communicating with the channels and providing means for connecting a source of droplet liquid to the channels.

47. The method claimed in Claim 46, characterized by forming said bonds as solder bonds.

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48. The method claimed in Claim 47, characterized by depositing solder on either or both the tracks and the electrodes, locating the channels opposite the tracks and forming the bonds to connect the tracks each to the electrodes of the channel facing surfaces of the walls of the channel opposite thereto.

49. The method claimed in Claim 48, characterized by heating at least the solder thereby to cause the solder to wet the tracks and the adjoining electrodes thereby to form a meniscus bridging the tracks and adjoining electrodes and cooling the solder to form said bonds.

50. The method claimed in Claim 46, characterized by forming said tracks on said channel closure sheet of width approaching that of the spacing of the electrodes on the channel facing walls.

51. The method of manufacturing a multi-channel array droplet deposition apparatus which comprises providing a base sheet having a layer of piezoelectric material poled normal to said sheet, forming an array of parallel, open-topped droplet liquid channels in said base sheet layer so that the piezoelectric material provides upstanding walls separating successive channels, forming electrodes on channel facing surfaces of the walls, bonding a channel closure sheet to the walls, forming said channels closure sheet with an array of parallel conductive tracks spaced at intervals corresponding with the channel spacing, locating the channels in position parallel with and opposite said tracks, and sealing the closure sheet to the channel walls by forming bonds which mechanically and electrically connect each track to the electrodes on the channel facing sides of the walls of the channel opposite thereto, providing nozzles respectively communicating with the channels, providing a manifold, and attaching said manifold for delivering droplet liquid into said channel.

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52. Method according to Claim 51, characterized by attaching said manifold to said base sheet and said channel closure sheet.

53. Method according to Claim 51 and wherein said liquid channels extend in a first direction, said manifold extending transversely to said first direction.

54. Method according to Claim 53, characterized by forming said manifold with an L-shaped cross-section, thereby to define together with said base sheet and said channel closure sheet a transverse duct for delivery of droplet liquid into the channels.

55. Method according to Claim 51, characterized by attaching said manifold so as to deliver droplet liquid into the ends of said channels.

56. Method according to Claim 55, characterized by attaching said manifold to the end of the channels.

57. Method according to Claim 51, characterized by attaching the manifold so as to lie adjacent drive circuit means connected to said tracks.

58. Method according to Claim 51, characterized by forming said bonds as solder bonds.

59. A multi-channel array droplet deposition apparatus comprising a base sheet having a layer of piezoelectric material poled normal thereto, an array of parallel, open-topped, droplet liquid channels in said base sheet layer provided by upstanding channel separating walls formed in said layer, electrodes providing on channel facing surfaces of the walls, a channel closure sheet bonded to the walls, nozzles respectively communicating with the channels and means for supplying droplet liquid to the channels, wherein said channel closure sheet has an array of parallel conductive tracks thereon spaced at intervals corresponding with the channel spacing and disposed parallel with and opposite the channels and bonds mechanically and electrically connect each track to the electrodes on the channel facing walls of the channel opposite thereto and seal the closure sheet to the channels, and wherein said means for supplying droplet liquid includes a manifold, said manifold being non-integral with said base sheet and said channel closure sheet.

60. The apparatus ~~Apparatus~~ according to Claim 59, wherein said manifold is attached to both said base sheet and said channel closure sheet.

61. The apparatus ~~Apparatus~~ according to Claim 60, wherein said liquid channels extend in a first direction, said manifold extending transversely to said first direction.

62. The apparatus ~~Apparatus~~ according to Claim 61, wherein said manifold is formed with an L-shaped cross-section, thereby to define together with said base sheet and said channel closure sheet a transverse duct for delivery of droplet liquid into the channels.

63. The apparatus ~~Apparatus~~ according to Claim 59, wherein said manifold is attached so as to deliver droplet liquid into the ends of said channels.

64. The apparatus ~~Apparatus~~ according to Claim 63, wherein said manifold is attached to the end of the channels.

65. The apparatus ~~Apparatus~~ according to Claim 59 ~~51~~, wherein said apparatus further comprises drive-circuit means connected to said tracks, wherein the manifold is attached so as to lied adjacent said drive circuit means.

66. The apparatus ~~Apparatus~~ according to Claim 59 ~~51~~, wherein said bonds are formed as solder bonds.

67. A piezoelectric ink jet print head, comprising:

a) a body of ~~piezoelectrical~~ piezoelectric material having a plurality of parallel open topped channels separated by walls, said walls having metal electrodes on opposite sides thereof to form shear mode actuators for effecting droplet expulsion from the channels;

b) a top cover of insulating material having a pattern of parallel metal conductors aligned with the open tops of said channels and extending beyond said body in a direction parallel with said channels; and

c) said top cover being attached to said body by solder joints between said conductors and said electrodes, and wherein said conductors provide electrical contact to said electrodes.

68. The apparatus claimed in Claim 67, wherein said electrical conductors and electrodes comprise nickel and said solder joints comprise an alloy of indium.

69. The apparatus claimed in Claim 67, further comprising an orifice ~~plate~~ plate over one end of said channels for ejection of droplets of ink therefrom.

70. A method of making a piezoelectric ink jet print head comprising the steps of:

a) forming a body of piezoelectric material having a plurality of parallel open topped channels separated by walls;

b) forming metal electrodes on opposite sides of said walls;

c) forming a top cover of insulating material having a pattern of parallel metal conductors congruent with the open tops of said channels;

d) coating said electrodes and said conductors with solder;

e) placing said top cover on said body; and

f) heating said top cover and body to reflow said solder to bond said top to said body.

71. The method claimed in Claim 70, further comprising the step of:

bonding an orifice plate over one end of said channels in said body.

72. A piezoelectric ink jet print head, comprising:

a) a sheet of piezoelectric material poled in a direction normal to said sheet and defining a plurality of parallel channels mutually spaced in an array direction normal to ~~the~~ a length of said channels, each channel being defined by facing side walls and a bottom surface extending between the respective side walls, each of said side walls including side electrodes on opposite sides thereof to form shear mode actuators for effecting droplet expulsion from the channels, each said electrode extending along ~~the~~ a length of the corresponding side wall; and

b) a top sheet of insulating material having a pattern of parallel top electrodes formed thereon, said top electrodes being aligned with and facing ~~the~~ tops of said channels, and being attached by solder to said side electrodes to attach said top sheet to said print head and to close said channels at the tops thereof.

73. The apparatus of Claim 72, wherein said top sheet and top electrodes extend beyond said sheet of piezoelectric material in a direction parallel to said channels.